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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/446,008	03/14/2000	GILLIAN F. MARSHALL	124-738	1673

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EXAMINER
TILLERY, RASHAWN N

ART UNIT	PAPER NUMBER
2612	7

DATE MAILED: 12/18/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/446,008	MARSHALL ET AL.	
	Examiner	Art Unit	
	Rashawn N Tillery	2612	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *16 December 1999*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-21* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-21* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☒ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

13)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

a) ☐ The translation of the foreign language provisional application has been received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Specification

1. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

2. The following guidelines illustrate the preferred layout for the specification of a utility application. These guidelines are suggested for the applicant's use.

Arrangement of the Specification

As provided in 37 CFR 1.77(b), the specification of a utility application should include the following sections in order. Each of the lettered items should appear in upper case, without underlining or bold type, as a section heading. If no text follows the section heading, the phrase "Not Applicable" should follow the section heading:

(a) TITLE OF THE INVENTION.
(b) CROSS-REFERENCE TO RELATED APPLICATIONS.
(c) STATEMENT REGARDING FEDERALLY SPONSORED RESEARCH OR DEVELOPMENT.
(d) INCORPORATION-BY-REFERENCE OF MATERIAL SUBMITTED ON A COMPACT DISC (See 37 CFR 1.52(e)(5) and MPEP 608.05. Computer program listings (37 CFR 1.96(c)), "Sequence Listings" (37 CFR 1.821(c)), and tables having more than 50 pages of text are permitted to be submitted on compact discs.) or
REFERENCE TO A "MICROFICHE APPENDIX" (See MPEP § 608.05(a). "Microfiche Appendices" were accepted by the Office until March 1, 2001.)
(e) BACKGROUND OF THE INVENTION.
(1) Field of the Invention.
(2) Description of Related Art including information disclosed under 37 CFR 1.97 and 1.98.
(f) BRIEF SUMMARY OF THE INVENTION.
(g) BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWING(S).
(h) DETAILED DESCRIPTION OF THE INVENTION.
(i) CLAIM OR CLAIMS (commencing on a separate sheet).
(j) ABSTRACT OF THE DISCLOSURE (commencing on a separate sheet).
(k) SEQUENCE LISTING (See MPEP § 2424 and 37 CFR 1.821-1.825. A "Sequence Listing" is required on paper if the application discloses a nucleotide or amino acid sequence as defined in 37 CFR 1.821(a) and if the required "Sequence Listing" is not submitted as an electronic document on compact disc).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

1-3, 5-7, 9-15, 17-20

Claims ~~1-21~~ are rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant's conceded prior art.

Regarding claims 1 and 2, Applicant's conceded prior art discloses, in the configuration shown in figure 1,

the photon detecting means (12) is arranged to provide an output current which is supplied to the current load device (14);

the current load device has a current-voltage characteristic in which the voltage is a logarithmic function of current flow "[i]n situations in which the leakage current is negligible[.]" See page 12, lines 5-7.

Applicant does not expressly disclose, in the configuration shown in figure, 1 a phototransistor.

However, Applicant's conceded prior art references an article by Mead, *Analog VLSI and Neural Systems,* that teaches it is well known in the art to replace a photodiode with a bipolar transistor with gain *beta*. It would have been obvious to one of ordinary skill in the art to modify Applicant's prior art teachings in the configuration

shown in figure 1 by replacing the photodiode with a phototransistor. One would have been motivated to do so in an effort to improve low light sensitivity.

The examiner notes that because Applicant's claims are directed to apparatus, and the prior art discloses all the structural limitations of the claims, the prior art inherently teaches "[a] substantially temperature-insensitive photodetector circuit" as claimed. See MPEP 2114.

Regarding claim 3, Applicant's conceded prior art discloses the phototransistor and current load device are arranged to provide an output signal including a contribution from leakage current and a contribution responsive to incident illumination and the latter contribution exceeds the former at all normal operating temperatures of the circuit such that the circuit is substantially temperature insensitive (see page 1, lines 29-34; Applicant's referenced prior art, Mead, uses a gain of *beta* which insures that the signal is greater than the leakage current).

The examiner notes that because Applicant's claims are directed to apparatus, and the prior art discloses all the structural limitations of the claims, the prior art inherently teaches "[a] substantially temperature-insensitive photodetector circuit" as claimed. See MPEP 2114.

Regarding claim 5, Applicant's conceded prior art discloses, in figure 1, the current load device is a MOSFET device with is source (16) or drain connected to the phototransistor and the phototransistor is arranged to produce an electric current which is low enough to operate the MOSFET in its subthreshold regime (see page 10, line 18 to page 11, line 10 where figure 1 is discussed).

Regarding claim 6, Applicant's conceded prior art discloses, in figure 1, the phototransistor is a bipolar transistor incorporating a photo detecting base region and with emitter connected to the load MOSFET.

Regarding claim 7, Applicant's conceded prior art discloses a photodetector circuit characterized in that it includes a photodetector (12), a load MOSFET (14) and voltage detecting means (22, 30, 34) wherein:

the photodetector is arranged to supply photocurrent output to the load MOSFET (inherent feature);

the photodetector is arranged such that photocurrent is sufficiently small to maintain subthreshold operation of the load MOSFET (see page 10, line 18 to page 11, line 10 where figure 1 is discussed); and

voltage detecting means is arranged to detect a voltage output from the load MOSFET in response to photocurrent supply (22, 30, 34).

Applicant does not expressly disclose, in the configuration shown in figure 1, a phototransistor.

However, Applicant's conceded prior art references an article by Mead, *Analog VLSI and Neural Systems,* that teaches it is well known in the art to replace a photodiode with a bipolar transistor with gain *beta*. It would have been obvious to one of ordinary skill in the art to modify Applicant's prior art teachings in the configuration shown in figure 1 by replacing the photodiode with a phototransistor. One would have been motivated to do so in an effort to improve low light sensitivity.

The examiner notes that because Applicant's claims are directed to apparatus, and the prior art discloses all the structural limitations of the claims, the prior art inherently teaches "[a] substantially temperature-insensitive photodetector circuit" as claimed. See MPEP 2114.

Regarding claim 9, Applicant's conceded prior art discloses the photodetector is for the purpose of operation in environmental temperatures ranging from –20 to 60 degrees Celsius with substantially unaffected sensitivity at illumination levels to 1 lux (the examiner notes that in apparatus claims, the "intended use must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art." *In re Casey*, 370 F.2d 576, 152 USPQ 235 (CCPA 1967). Thus, the examiner notes that the claimed feature is inherently taught in Applicant's conceded prior art since the prior art discloses the structural limitations of the claim).

Regarding claim 10, Applicant's conceded prior art discloses the circuit incorporates an attenuator arranged to reduce the intensity of light prior to incidence on the photon detecting means to an extent necessary to provide for the resultant output current to be low enough to operate the MOSFET in its subthreshold regime (see page 10, line 18 to page 11, line 10 where figure 1 is discussed).

Regarding claim 11, Applicant's conceded prior art discloses the photodetector is capable of operation in environmental temperatures ranging from –20 to 60 degrees Celsius with substantially constant contrast sensitivity (the examiner notes that in apparatus claims, the "intended use must result in a structural difference between the

claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art." *In re Casey*, 370 F.2d 576, 152 USPQ 235 (CCPA 1967). Thus, the examiner notes that the claimed feature is inherently taught in Applicant's conceded prior art since the prior art discloses the structural limitations of the claim).

Regarding claim 12, Applicant's conceded prior art discloses, in figure 1, the load MOSFET and phototransistor are connected at a common connection point (18) to buffering means (22) and the buffering means is connected to a pixel readout circuit.

Regarding claim 13, Applicant's conceded prior art discloses, in figure 1, that the photodetector circuit is incorporated in an array of like circuits (10).

Regarding claim 14, Applicant's conceded prior art discloses, in figure 1, that the detector array is an array of photodetector circuits.

Regarding claim 20, Applicant's conceded prior art discloses, in figure 1, a method of measuring photon radiation intensity over a dynamic range greater than four orders of magnitude characterized in that the method comprises steps of (see claim 1 above);

providing a photodetector circuit (10) comprising a bipolar phototransistor (see claim 1 above) arranged to supply output current to a load MOSFET (14);

arranging the photodetector to respond to incident radiation by providing output current to operate the load MOSFET subthreshold (see page 10, line 18 to page 11, line 10 where figure 1 is discussed);

detecting the load MOSFET output voltage response to the output current (22, 30, 34).

Applicant does not expressly disclose, in the configuration shown in figure 1, a phototransistor.

However, Applicant's conceded prior art references an article by Mead, *Analog VLSI and Neural Systems,* that teaches it is well known in the art to replace a photodiode with a bipolar transistor with gain *beta*. It would have been obvious to one of ordinary skill in the art to modify Applicant's prior art teachings in the configuration shown in figure 1 by replacing the photodiode with a phototransistor. One would have been motivated to do so in an effort to improve low light sensitivity.

The examiner notes that because Applicant's claims are directed to apparatus, and the prior art discloses all the structural limitations of the claims, the prior art inherently teaches "[a] substantially temperature-insensitive photodetector circuit" as claimed. See MPEP 2114.

Regarding claims 15 and 19, Applicant's conceded prior art does not expressly disclose the type of system that incorporates the array of photodetector circuits. However, Official Notice is taken that it is well known in the camera art to utilize an array of photodetector circuits in a digital camera. It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the array of photodetector circuits in a digital camera since photodetector circuits are notoriously associated with cameras.

Regarding claim 17, Applicant's conceded prior art does not expressly disclose the type of system that incorporates the array of photodetector circuits. However, Official Notice is taken that it is well known in the camera art to utilize an array of

photodetector circuits in a hand-held computer technologies such as PDAs and cellur camera phones. It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the array of photodetector circuits in a hand-held computer technology since photodetector circuits are notoriously associated with cameras.

Regarding claim 18, Applicant's conceded prior art does not expressly disclose the type of system that incorporates the array of photodetector circuits. However, Official Notice is taken that it is well known in the camera art to utilize an array of photodetector circuits in PDAs. It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the array of photodetector circuits in a PDA since photodetector circuits are notoriously associated with cameras.

2. Claims 4, 8, 16 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant's concede prior art in view of Tanaka (US5965892).

Regarding claim 4, Applicant's conceded prior art does not expressly disclose a fabrication process. Tanaka reveals that it is well known in the art to fabricate a bipolar transistor and MOSFET using a BiCMOS technology (see col. 7, lines 36-46). It would have been obvious to one of ordinary skill in the art to implement Tanaka's teachings in an effort to fabricate the bipolar-MOSFET structure at a sufficiently low cost.

Regarding claim 8, Applicant's conceded prior art does not expressly disclose a fabrication process. Tanaka reveals that it is well known in the art to fabricate a bipolar transistor and MOSFET using a BiCMOS technology (see col. 7, lines 36-46). It would

have been obvious to one of ordinary skill in the art to implement Tanaka's teachings in an effort to fabricate the bipolar-MOSFET structure at a sufficiently low cost.

Regarding claim 16, Applicant's conceded prior art discloses, in figure 1, an array of photodetector circuits characterized in that each circuit (10) incorporates photon detecting means (12) arranged to produce an electric current in response to incident photon illumination associated with a current load device (14) arranged to produce a voltage response to current flow, and wherein

the photon detecting means is arranged to provide an output current which is supplied to the current load device;

the current load device has a current-voltage characteristic in which the voltage is a logarithmic function of current flow "[i]n situations in which the leakage current is negligible[.]" See page 12, lines 5-7;

the photodiode and current load device are arranged to provide an output signal including a contribution from leakage current and a contribution responsive to incident illumination and the latter contribution exceeds the former at all normal operating temperatures of the circuit such that the circuit is substantially temperature insensitive.

Applicant does not expressly disclose, in the configuration shown in figure 1, a phototransistor.

However, Applicant's conceded prior art references an article by Mead, *Analog VLSI and Neural Systems,* that teaches it is well known in the art to replace a photodiode with a bipolar transistor with gain *beta*. It would have been obvious to one of ordinary skill in the art to modify Applicant's prior art teachings in the configuration

shown in figure 1 by replacing the photodiode with a phototransistor. One would have been motivated to do so in an effort to improve low light sensitivity.

The examiner notes that because Applicant's claims are directed to apparatus, and the prior art discloses all the structural limitations of the claims, the prior art inherently teaches "[a] substantially temperature-insensitive photodetector circuit" as claimed. See MPEP 2114.

Applicant's conceded prior art does not expressly disclose a fabrication process. Tanaka reveals that it is well known in the art to fabricate a bipolar transistor and MOSFET using a BiCMOS technology (see col. 7, lines 36-46). It would have been obvious to one of ordinary skill in the art to implement Tanaka's teachings in an effort to fabricate the bipolar-MOSFET structure at a sufficiently low cost.

Applicant's conceded prior art does not expressly disclose the type of system that incorporates the array of photodetector circuits. However, Official Notice is taken that it is well known in the camera art to utilize an array of photodetector circuits in a digital camera. It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the array of photodetector circuits in a digital camera since photodetector circuits are notoriously associated with cameras.

Regarding claim 21, Applicant's conceded prior art does not expressly disclose a fabrication process. Tanaka reveals that it is well known in the art to fabricate a bipolar transistor and MOSFET using a BiCMOS technology (see col. 7, lines 36-46). It would have been obvious to one of ordinary skill in the art to implement Tanaka's teachings in an effort to fabricate the bipolar-MOSFET structure at a sufficiently low cost.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Rashawn N Tillery whose telephone number is 703-305-0627. The examiner can normally be reached on 9AM-6:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wendy Garber can be reached on 703-305-4929. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9314.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-305-4750.

RNT

WENDY R. GARBER
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